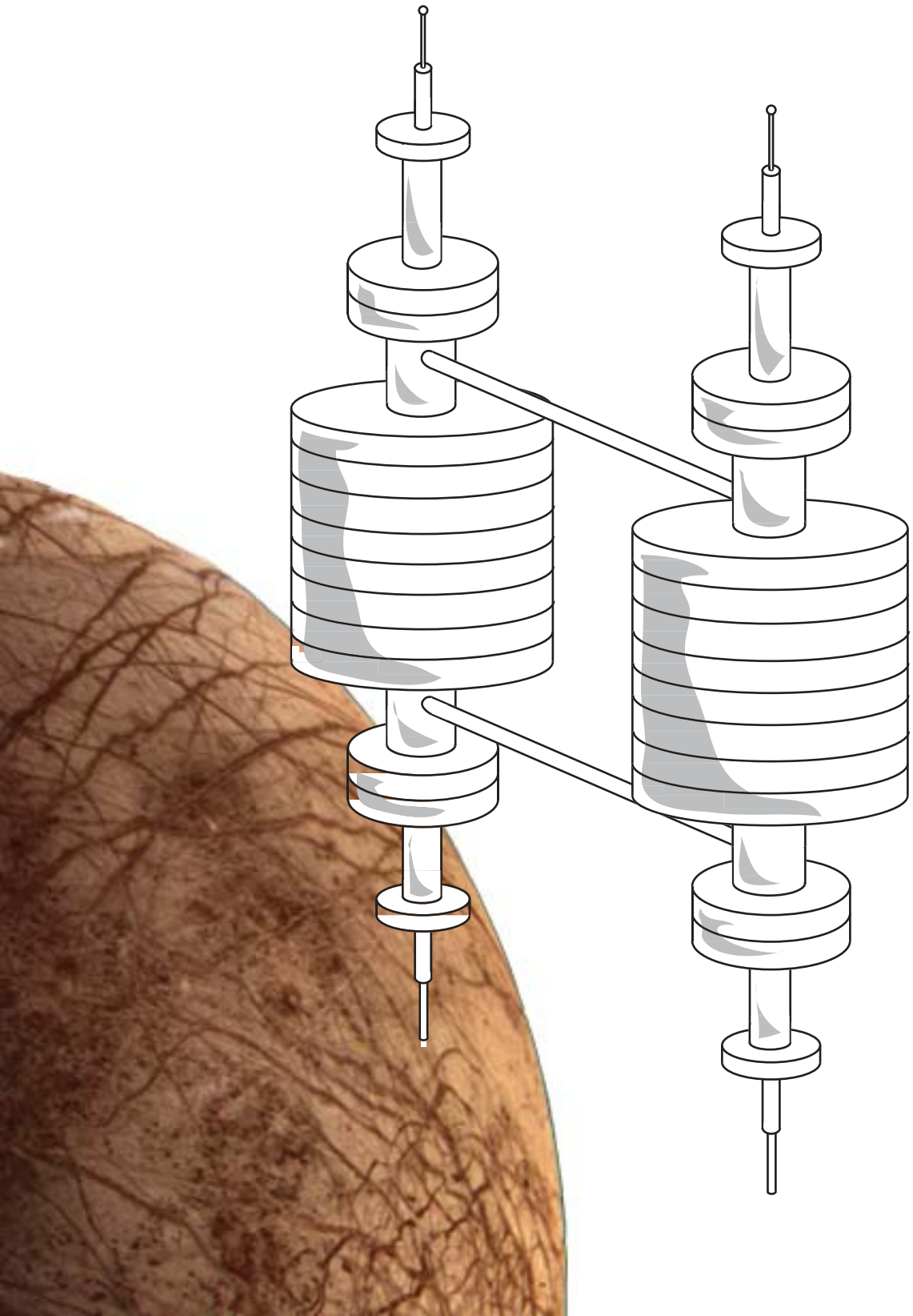
EUROPA 2



EUROPA 2

Submitted by the members of
Collierville Middle School Young Astronaut Club
Collierville, Tennessee

Jennifer Baldwin
Kelly Baldwin
Samantha Bean
Steven Bossé
Drew Conner
John Daunais
Ashley Kucsmas
Kevin Lynch
Alex Muse
Dustin Perry
Dylan Perry
Tanner Treadway
Alex Vranas
Mike Baldwin, Volunteer Advisor
Thomas Keys, Faculty Advisor

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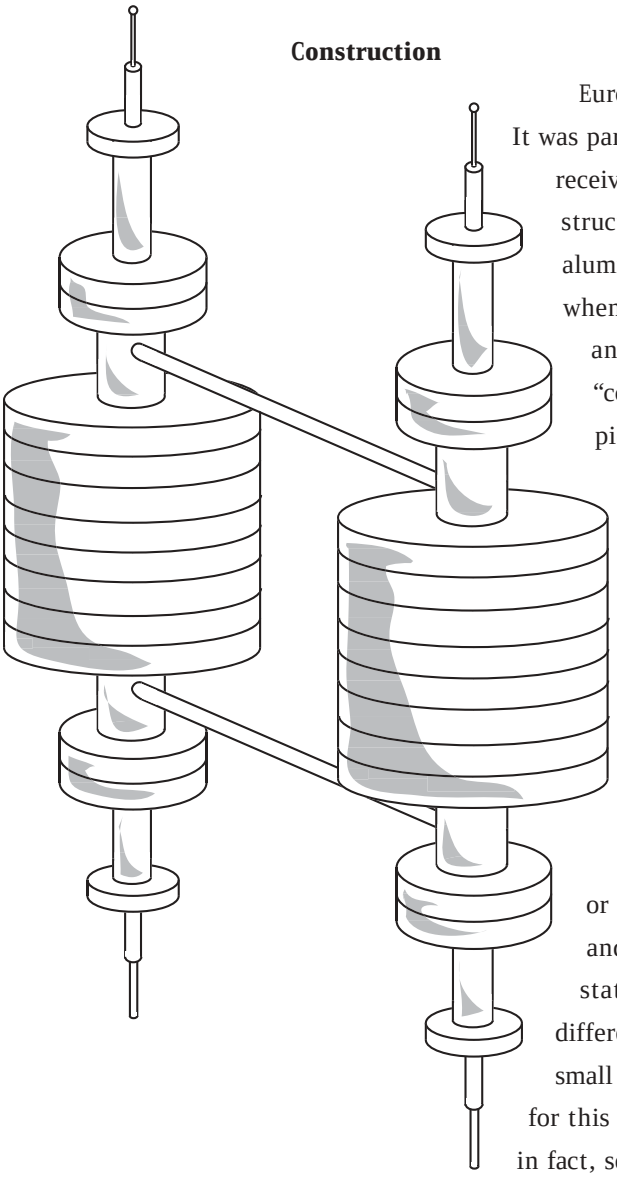
"Though earth and moon were gone,
And suns and universes ceased to be,
And though wert left alone,
Every existence would exist in thee.
There is not room for Death,
Nor atom that his might could render void:
Thou-Thou art Being and Breath,
And what Thou art may never be destroyed."
-Emily Bronte, "Last Lines"

The year is 2300. Pollution has filled the air and water and our planet is almost in ruins. The greenhouse effect has finally destroyed much of our atmosphere and caused the surface temperatures to rise to an alarming high. Consumption of natural resources has caused wars to develop between nations all over the face of Earth, or as Robert Heinlen would say, *Terra, our beautiful planet*. Humans struck out in search of another place to live. We had to go back to the pioneering ways, like the times when your home was a chuck wagon or flatboat. Now our homes are "ships of the stars". Traveling from place to place in search of new homes, independent families and groups use small ships to traverse between Earth and the solar system. Almost daily one of these small ships, about the size of a nuclear submarine, blasts off to find a better home. Once in a while, though, a large group of people design a huge ship, a colony, to contain as many people as possible. They build it, examine it inch by inch, and launch it into space. Occasionally, someone will resurrect an ancient set of plans, and build their colony in space. Sometimes new space colonies are the work of engineers and architects who launch into Earth orbit and devise their plans enroute to a new life. This is how Europa 2 came into being.

Europa 2 was intended as a refuge for a few thousand people who were seeking journey to other worlds to live in better conditions than those on Earth. Europa 2 was launched from Earth orbit, mostly complete, toward Mars. Europa 2 orbited Mars until the next and final phases of construction were completed. After all its inhabitants, provisions, and supplies were safely secured onboard, Europa 2 deployed mylar solar sails, escaped Mars' gravity, and launched toward the outer planets. Europa 2's destination was the moons of Jupiter. Because of present water mining operations on the surface of Europa, that moon was chosen as the home base for Europa 2 (see Appendix 1).

Europa is the sixth moon of Jupiter, and appears as smooth as a Ping-Pong ball from space. The closer you get though, the more it looks like the surface of an egg covered with cracks. Europa is covered with cracks. Europa's outer "shell" is made of a sheet of ice, 10 to 100 miles thick depending on where you are. Inside it's "shell" is an

ocean of ice and slush, the source of our water. This “ocean”, in turn, covers a rocky core. The water is heated by the core, which, is like the bottom of the Earth's oceans. Vents on the Earth's ocean floor eject seawater filled with hydrogen sulfide and minerals, and few animals can survive in such conditions. Perhaps we may find life in the oceans of Europa. If we can maintain our orbit near Europa, we will be able to mine minerals from its core. Europa is also a good vantage point for communication with Earth. We maintain an orbit in conjunction with Europa which allows us to communicate for long periods of time with Earth without interference.

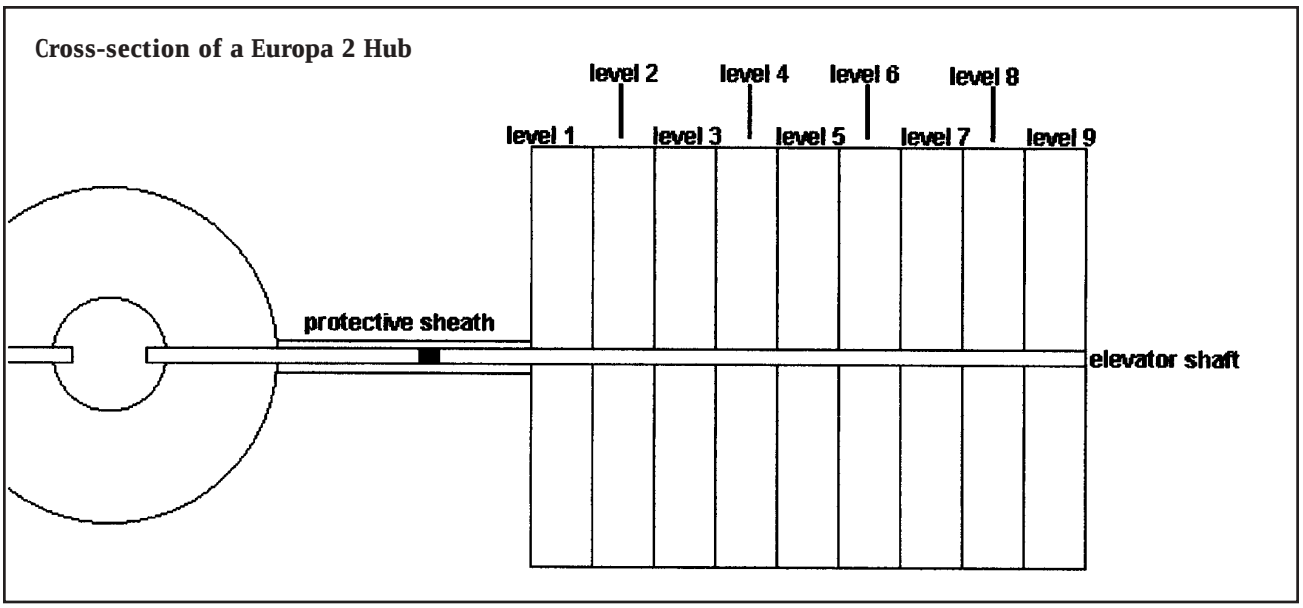


Construction

Europa 2 is constructed of layers of aluminum and titanium. It was partially built in Earth orbit, then moved to Martian orbit to receive final inhabitants and perform the next phases of construction. The outer layer is constructed of 10cm of solid aluminum plates. The plates will be flared out at the edges when constructed, and then the flares will be melted together and polished to form a smooth surface. The second layer is “constructed” of a high-elasticity polymer embedded with pieces of titanium. This layer serves as a barrier for micro-asteroids that penetrate the first layer, the polymer being there to absorb the shock and slow it down, the titanium being there to stop it. This layer is 15cm thick. The next layer will be a 5cm thick wall of titanium, and the layer following that will be an aluminum honeycomb filled with air in the spaces to provide additional strength to our structure. The last layer is going to be a 10cm thick layer of titanium/aluminum sandwich.

Europa 2 has two main hubs. Both hubs are 27.432m, or 30 yards tall and 27.432m wide. Each hub has nine levels, and each level is to be 3.048m, or 10 feet tall. The space station as a half is a mirror image of the other half. The only difference is the location of internal objects. Europa 2 has two small hubs, two middle hubs, and two large hubs. The purpose for this is so we can rotate the entire ship at one relative speed, but, in fact, separately the hubs rotate at different speeds. The small hubs rotate the slowest, and the large hubs rotate the fastest, creating different specific gravities depending upon their rotation time around the center axis. The two smallest hubs are 1.5km in diameter, the middle hubs, 3km, and the largest, 4.5km in diameter. The “front” half contains the flight deck (see Appendix 2), and points downward toward the moon, Europa. The “back” contains a towed radar array/ solar panel array “taillights” and an additional power source.

The space station rotates at a speed of 9.8m/sec. This creates a specific gravity of 1 on the smallest hubs (these hubs being the “controls”), a specific gravity of 2 on the middle hubs, and a specific gravity of 4 on the largest hubs. The smallest hubs contain living quarters, education modules, and entertainment modules. The largest hubs contain industrial equipment for the manufacture and distribution of medicines, clothing, hover-car components, food production, household items, chemicals, metals, repair materials, communication devices, and other minor areas of manufacture. The middle hubs are split in half, one half for the growth and reproduction of domesticated meat animals, poultry, and plant-produced food. The other half of each contains more living quarters, and all of the other commodities found in the small hubs. All of the hubs are divided into 10 sectors each, and each sector has nine levels.



Housing

Housing on the small and medium hubs is achieved by small, 4.572m wide by 15m long “houses”, separated from other “houses” by soundproof, removable partitions. Each “house” has accommodations for two people. It has a kitchen unit similar to the ones used on the ancient Space Shuttles from 315 years ago. Each kitchen area has a dehydrator, refrigerator, vacuum-sealing machine, pantry, rehydrator, and microwave oven. It is one, detachable unit 2.1336m or 7' tall, and 0.6096m wide (2'). Each kitchen unit has a stool which comes out at about .4m height to help the inhabitants reach the top shelf area or be more comfortable with their activities. Each house has two rooms: a kitchen/ dining room, and a 2-bed bedroom, with bunkbed-style beds, a refreshing area (sink, toiletries) set apart by a sliding wall, and drawers built into the wall, 4 per person.

Family units with 3 or 4 persons occupy two houses. The partition will be taken out and the house next to you will become yours. The kitchen unit of the second house will be removed and converted into a family living area. Europa 2 has a limit to the number of four-person families, two-person families, and single person units allowed. No

family unit may have more than four people. There will be an average of 1500 “houses” per level per small hub, which uses 10.9728 % of the available cubic area, or 1,028,700m^3.

People

The population aboard our space station consists primarily of volunteer married couples who have a skill beneficial to the colony. Each person taken aboard took a literacy test and a comprehension test. Those who successfully completed the battery of tests were interviewed and the Europa 2 population was set at 30,000 couples. Europa 2 residents are scientists, engineers, military personnel (Air Force, Space Marines, Marines, Army, Navy), medical staff (Doctors, physicians, pediatricians, etc.), educators, environmental experts, technical advisors, commercial and industrial workers, specialized fields (mining, water and air conservation, metallics, medicinal industry, hydroponic engineers, etc.), and regular people who have particular talents or skills useful to the people of Europa 2. Marriage is encouraged, but divorce and abortion are unlawful.

Laws

1) Acts of aggression against fellow Europans is unlawful.*
2) Divorce is unlawful.
3) Abortion is unlawful.
4) Illicit drugs, alcohol, and tobacco are unlawful.
5) Young people aboard must continue schooling at their own pace until the 12th level of education is completed. College level courses are required after completion of 12th level education.

*Punishment will be equal to the crime.

Simplified Constitutional Rights

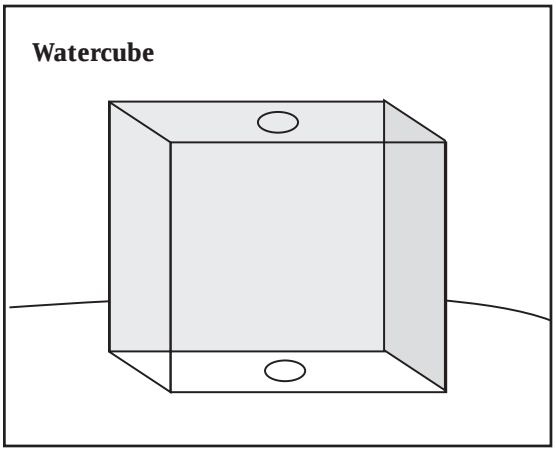
1) Freedom of speech
2) Freedom of religion
3) Freedom from unlawful search and seizure
4) Freedom of choice
5) Freedom to an unbiased trial
6) Right to free enterprise

Air & Water

Air on Europa 2 consists of 74% nitrogen, 21% oxygen, 4% carbon dioxide, and 1% of other gases (e.g.-carbon monoxide, trace gases). Air is filtered through lithium hydroxide canisters produced in the colony. Two canisters at a time (cylindrically-shaped, measuring 2.5m long, and having a diameter of 1m each) are mechanically placed in a filtering cradle in each hub. One canister supplies air to half of a large hub or a whole small hub. Unfiltered air passes through one-way inlet valves that are programmed to open when unfiltered air passes by them. These valves lead the air to the filters, the

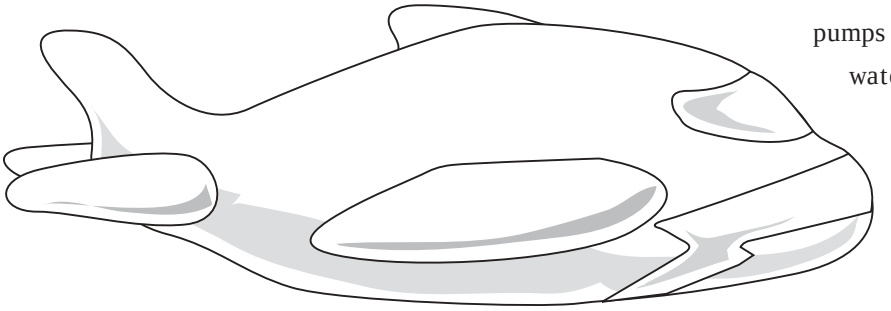
lithium hydroxide canisters. After the air inside is filtered, it is pumped out through one-way outlet valves along the outer wall. Filtered air has a scent added to it to keep it smelling clean, and then it is passed through a heater/cooler that heats or cools the air to a specific temperature depending on location during rotation. Air is cycled at a rate of 200 gallons per minute to keep the air fresh. Air is produced and filtered automatically onboard Europa 2.

Watercube



Water on Europa 2 comes from two sources: fusion and celestial replenishment. Europa 2's main energy source is the fusion generator. The generator bonds hydrogen and oxygen together to create pure energy, and collect the by-product, H20, or water. This water does not have to be filtered. It is pumped directly to the housing areas. The second method of water collection is by drilling teams on Europa's surface. The teams drill through the ice surface and pump water from the core. The first team to go down was equipped with the gear necessary to perform tests and evaluate the filtering needed. Afterward, a base was established on the surface to pump the water out, desalinize it and filter it, and send it in holding tanks back to the colony. Watercubes are used to collect the water from drilling units and the water is then pumped into water-transports for transfer to Europa 2. The watercubes are constructed with sensors which detect the water source and deploy hoses and pumps to collect and filter the water. Core water is filtered twice in the watercube before it is pumped into the watertransport. Water is filtered a third time before being down-loaded from the watertransport to the holding tanks on Europa 2.

Watertransport



Watertransports are constructed using a technology developed on Europa 2 called “Material Morphing”. Material morphing allows the shape of the transport to change according to the amount of water being transported. Material Morphing is explained below.

Material Morphing

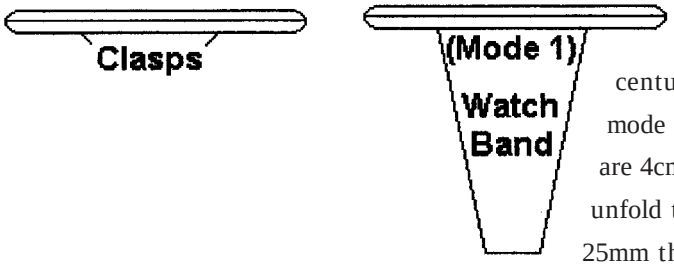
Material morphing is a technology which first appeared in the early twenty-first century on Earth. The engineers and scientists on Europa 2 developed the technology into a very useful enterprise. By embedding electrical sensors (in very close array) into the polymer material used for constructing transports, space cruisers, containers, material used for manufacturing clothing, household items such as dishes and chairs, the shape of the material can be controlled by electrical impulses sent to these sensors. Fiber optics have also been incorporated into the material, therefore allowing communication systems to be embedded. Pilots using this technology, are able to view their flight charts directly in front

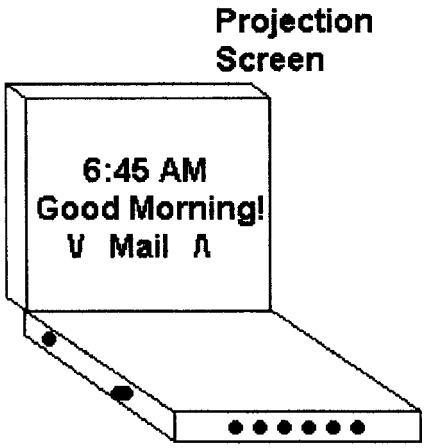
of them by sending fiber optic morph commands to the sensors. The Material Morphed Polymer is also self-healing. Punctures and tears in the material are automatically detected and self-healing commands are sent to the sensors via onboard computers.

Energy

Our main energy source is hydrogen-oxygen fusion. As a secondary source, solar panels will be used if they become necessary for additional power generation. Energy not used right away is directed to storage batteries in all of the hubs for later use or emergency use.

Holographic Projection Communicators

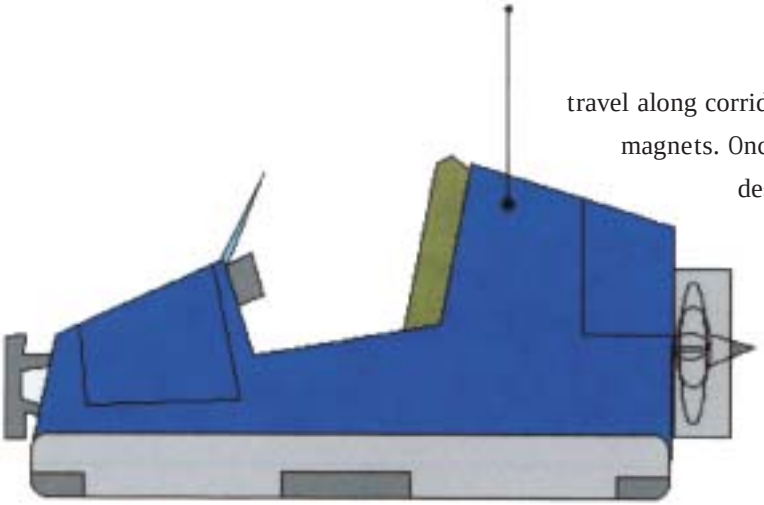




HPCs (or Holographic Projection Communicators) are similar to cell phone of the twenty-first century. HPCs have two modes, and can be switched from one mode to another. They are wrist-mounted in mode one, and are 4cm long ,4cm wide, and 50mm thick when folded. HPCs unfold to the size of 4.5cm tall, 4cm wide, 4.5cm wide, and 25mm thick, making a projection screen. The second mode allows the HPC to be unclasped from the watchband and hooked on to an EVA suit. In the second mode, they give life support readings (e.g.-air left, fatigue, and carbon monoxide and carbon dioxide levels), tell time, act as the "brains" of the EVA suit, and can automatically adjust temperature and suit pressure. HPCs hook up to the suit's communication system and send voice-actuated messages. They can pop open to show a diagram of an area in need of repair and list the equipment needed. The range of capabilities in mode one are: virtual teacher, map, watch, SPS (Station Positioning System) locator, communicator, "wallet", and voice-actuated writing tool. Each HPC has a male port on one side, and a female port on the opposite side. These are for money transference. For example, if you need to take money out of your account, you would plug it into the port at the bank and the money would be transferred from your bank account to your HPC, after giving a thumb scan. Information can be downloaded from the central computer simply by plugging it into the port on your wall. This information would include news and other daily information.

Transportation

Transportation within Europa 2 is accomplished in several ways. The hubs of each section of Europa 2 are connected by a spindle. Each section of Europa 2 is connected to the other section by way of transport tubes. **Transport bays** (similar to elevators of the twenty-first century) may be used to travel from one hub to another in each section. The transport bays traverse along the central area of the spindle. On either side of the transport bays are travelways which allow for personal transportation in the form of **Swifts**. Swifts are electromagneto vehicles which transport four persons comfortably. These swifts



travel along corridors which are equipped with pulsing electro-magnets. Once onboard a swift, you may program your destination using your HPC. Once the coordinates are set, the swift will deliver you quickly and safely to your destination. Motion and distance sensors in the front and back of the swift make it impossible to travel to close to another swift on the same travelway. Each family unit is provided with a personal swift.

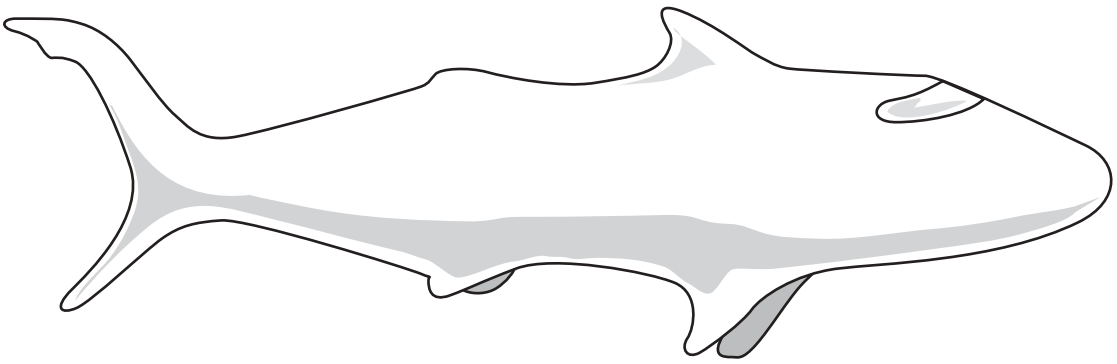
The Swift

For a pleasurable and alternative mode of transportation, **rocket skates** are provided to Europa 2 inhabitants. Rocket skates are enjoyed primarily by the younger Europans. Rocket skates are not allowed on the travelways, however, they are allowed in the corridors of each level of all hubs. Rocket skates can be programmed with your HPC and are powered by electromagnetic pulses generated in the floor of the corridors. Rocket skates use hover technology.

Moving walkways are provided in all corridors of all hubs.

For transportation outside the space colony, the primary vehicle is the **Shark**. Two types of Shark are found on Europa 2: (1) the Shark Transport; and (2) the Security Shark. The shark is aptly named, because of the shape of the transport.

The Shark



Using Material Morphing Technology (MMT), the Shark is constructed of a self-healing material embedded with sensors which allow the transport to change directions and maneuver in ways similar to a shark in water. Similar maneuverability is used with the watertransport vehicles. Doorways and outside orifices of both the Shark and the watertransport automatically open or seal as required.

Shark Transports may hold 30-60 people comfortably. Security Sharks operate with a crew of 6, and watertransports require a crew of 3. Shark Transports are used for

journeying to and from the surface of Europa and other near-space expeditions. Security Sharks are equipped for more long distance travel and recon operations.

Food Production

All food is grown or produced onboard Europa 2. Some small farm animals are produced for food consumption. Protein is also provided by the production of synthetic proteins. Protein can also be obtained from farm-produced sources such as soybeans and peanuts. The farms on Europa 2 are hydroponic gardens. In these gardens, the vegetables are produced in a soilless environment. Nutrient lines hang vertically from floor to ceiling in climate-controlled, light-controlled hydroponic rooms. Fruits and vegetables grow along the nutrient lines. These fruits and vegetables are harvested on a regular basis and shipped out to houses and mess halls throughout the colony. Hydroponic farmers on Europa 2 also provide food for the colonists living and working on the surface of Europa.

The list of fruits and vegetables produced on Europa 2 follows:

Tomatoes
Lettuce
Potatoes
Carrots
Celery
Cucumbers
Corn
Asparagus
Sweet potatoes
Squash
Pumpkins
Cabbage
Onions
Garlic

Rosemary
Basil
Barley
Parsley
Mint
Chives
Wheat
Oats
Soybeans
Peanuts

Apples
Oranges
Grapes
Lemons
Limes
Kiwi
Cantalope
Raspberries
Pomegranates
Strawberries
Blueberries
Blackberries
Grapefruit
Tangerines
Peaches
Watermelon

Security

To provide maximum security onboard Europa 2, visitors to the colony are required to undergo a security check prior to scheduling their visit. Once a visitor has arrived at Europa 2, he must receive a retina scan and voice check before entrance is permitted. Permanent residents of Europa must also receive a retina scan before being allowed entrance to secure areas of the colony.

Personal Access Devices (PADs) are located adjacent to the entryways to houses and work areas. You may gain entry to authorized areas by placing your left palm on the PAD. This procedure is called “palming”. Once you have palmed the PAD successfully, you

are permitted to continue. Palming is also used at sector mess halls, restaurants, and retail areas. You may use either palming or your HPC to transfer funds in these areas. Palming can also be used to gain access to public domain computers and information centers.

If there are any breaches of security, a Security patrol will be alerted. Security patrols are located on all levels of all hubs. Lockup units are located in the central hub. Tight security is maintained at all times.

Military security is maintained through the Office of Defense. Security Sharks patrol the space surrounding Europa 2 at all times. Security Sharks are equipped with photon lasers and magnetic deflection shields. A battery of laser stations encircle Europa 2 at a distance of 10km. These laser stations are equipped to detect and destroy approaching space debris (i.e. small asteroids), as well as protect and defend Europa 2 from hostile encounters with space terrorists or other unfriendly groups. The Interplanetary Space Command will be alerted and summoned should the need arise.

Policy on Cloning

Cloning is permitted on Europa 2 only for medical purposes, not for rejuvenation and restoring youth. Regeneration of limbs or organs is permitted in life-threatening situations only. Laser surgery and regular medical scans reduce the need for genetic engineering in most cases.

Clothing

Colonial clothing is produced onboard Europa 2 using Material Morphing Technology (MMT). During leisure and off-duty time, colonists are free to wear the clothing of their choice. At the time of purchase, all clothing is without color. To customize your attire, your only limitation is your imagination. Plug your attire into the MMT computer and choose the designs and colors that you like. If you would like to change the design you already have, plug your attire into the MMT computer and choose another design.

During work and school hours, uniforms are required. Second Skin is a temperature-controlled one-piece suit which allows the Europa 2 Control Center to know exactly where you are at all times during your work or school day through the fiber optics embedded in the fabric of your suit. Second Skin suits are color specific: bright colors for children, gray for the Commander, black for military and security personnel, white for medical professionals, light blue for scientists and researchers, green for environmentalists, tan for food processors, blue for manufacturers and miners, red, light green or yellow for educators.

Entertainment

Climbing walls: along the outside of the transport tubes and belay hooks and ropes which provide you with opportunities to climb and rapel along the tube. The belays

are automatic, therefore eliminating the possibility of you falling from the tube, once you hook in.

Restaurants: Nice, full-service restaurants are located throughout Europa 2. A variety of cuisines can be found, including Mexican, Chinese, French, American, Japanese, Indian, Russian, and others. No shoes, no shirt, no service in these restaurants.

YMCA: A YMCA, equipped with weight rooms, swimming pools, saunas, soccer facilities, and basketball courts is located in each of the main hubs.

Virtual Mall: If you can see it on the screen in this mall, you can purchase to own. Using MMT, almost anything can be manufactured on Europa 2. Many customizable items are in stock in the mall, but if it is not available, place your order and your purchase will be delivered to your house within 24 hours.

VR Module: The Virtual Reality (VR) Module is one of the most popular places on Europa 2. Using MMT, you can create your own adventure. If you want to climb a mountain peak, choose the peak you want to climb and the degree of difficulty from the VR HPC. Morphing Technology allows the module to transform into a mountain trail, complete with panoramic vistas and babbling brooks. If caving is your adventure, use the VR HPC to program your surroundings. Hangliding, skiing, surfing, you name it and the VR Module will take you there.

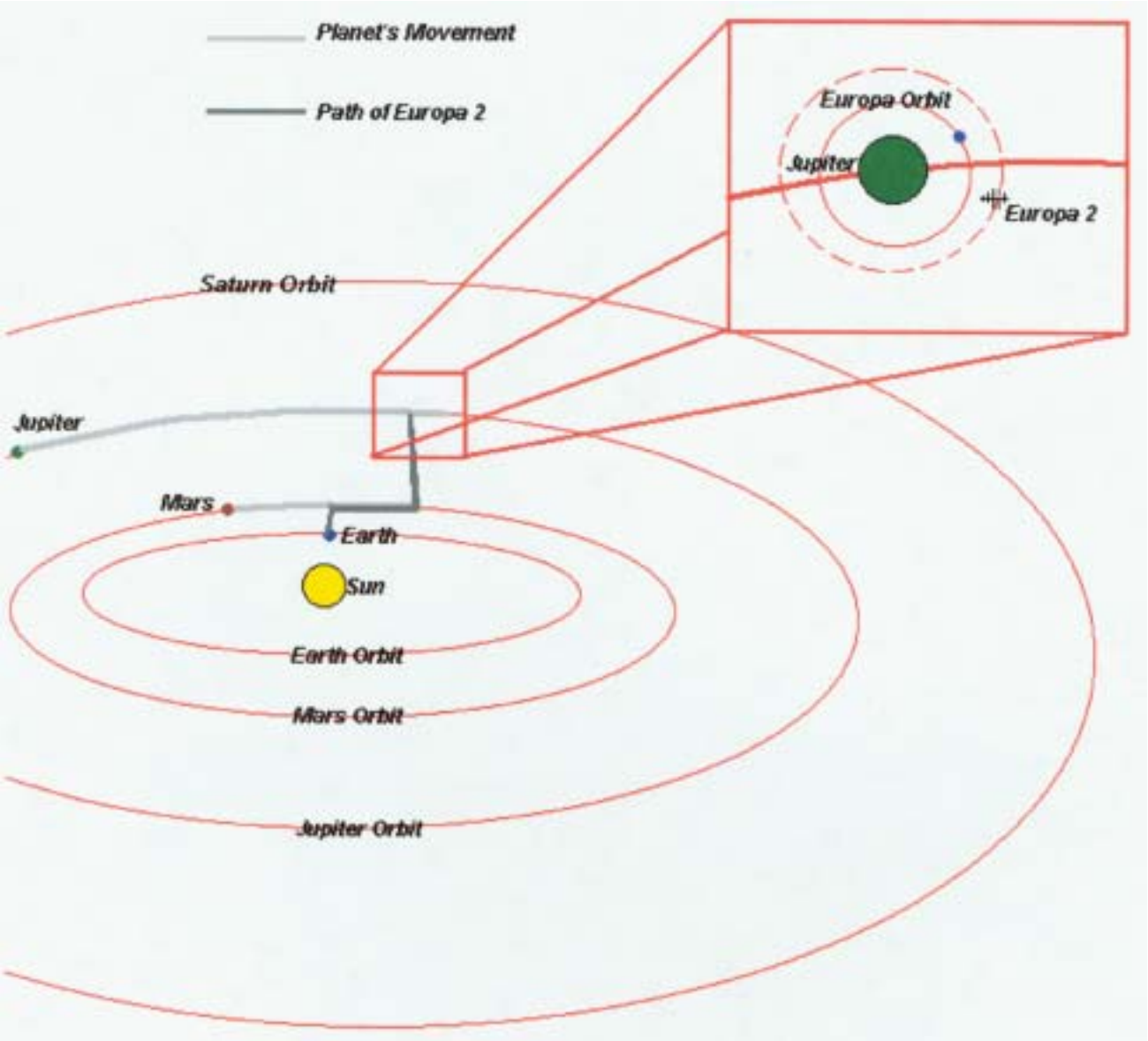
Domestic pets: As long as you keep him on a leash, you furry friend is welcome in the corridors of Europa 2. Europa 2 also provides grooming and daycare facilities for your pet. Colonists should never leave their pets at home alone. They can take advantage of the petcare facility anytime, 24 hours a day.

Fuzzy Morphs: Colonists may choose to have a fuzzy morph instead of a domestic pet. Fuzzy morphs are almost like having the real thing. These little fuzzy creatures can be programmed with a desired personality. They respond to your voice commands and follow you wherever you go. The advantage to fuzzy morphs is that you can shut them down at nighttime or when you're away from your house.

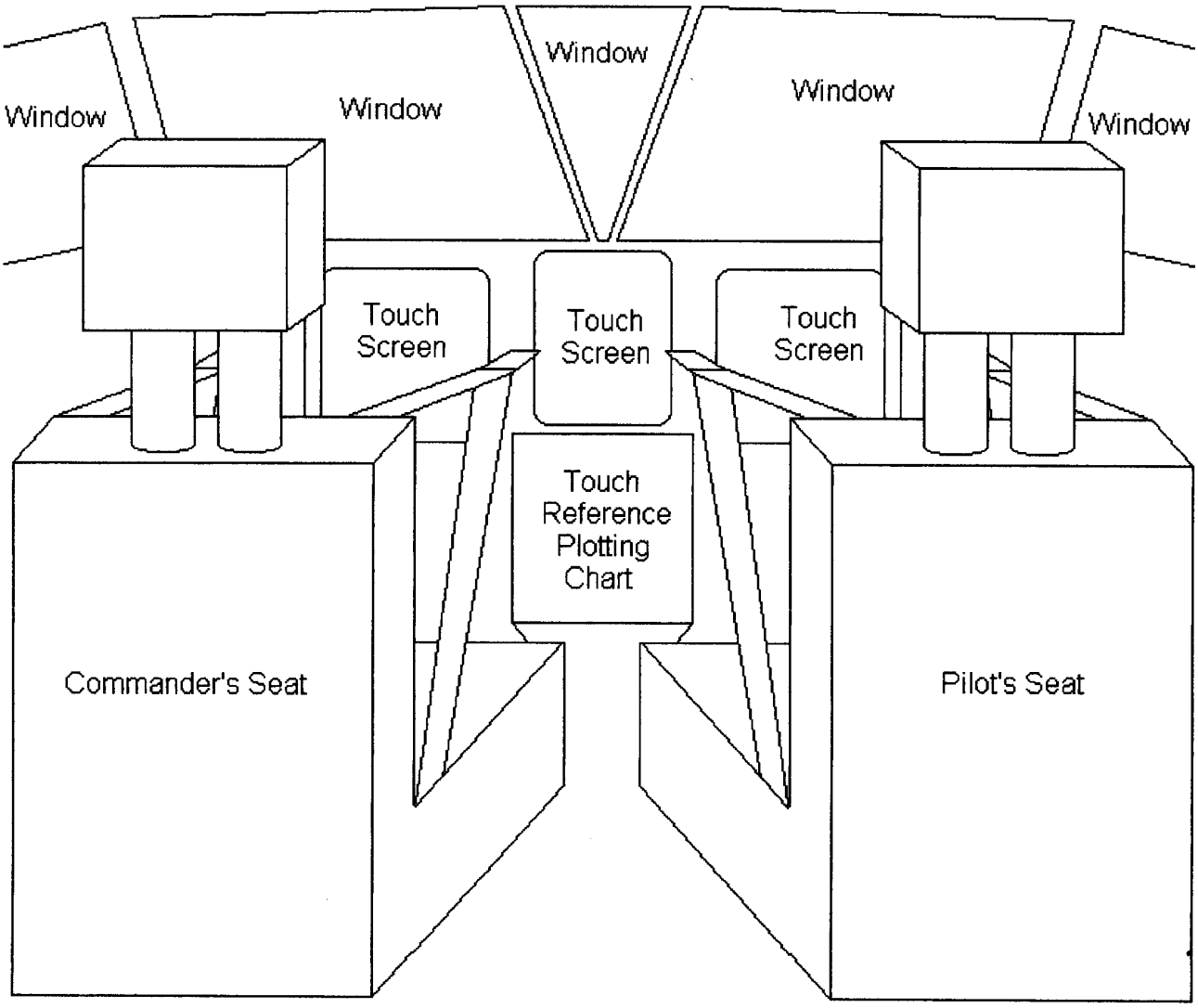
The future

Europa 2 has travelled a long way from our home planet, Earth. Although no place in the universe will ever take the place of Earth, Europa 2 has become home for thousands of people. Together we work, and play, and worship. We learn new technologies, and discover new frontiers. We have learned to survive and thrive in the dark vastness of space, where our Sun is only a glowing ball in the distance. We hope to return to our home planet some day. We hope to find a cure here, on Europa 2, for some of the problems and hatreds that simmer and boil on Earth. When we find that cure, we will return to Earth and share it with those that remain. We hope there are many. We hope the time is soon.

Appendix 1: The Path of Europa 2



Appendix 2: Europa 2 Flight Deck



Europa 2 Bibliography

Our "Europa 2" project was developed through a series of brainstorming sessions. During these sessions we would bring books and web addresses to the club meetings, talk about what new information we had discovered, brainstorm ideas, and incorporate them into our design. Here is a list of some of the resources we used for our research.

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Several daily eNewsletters including:

spacenews@SPACE.com
JPLNews@jpl.nasa.gov
NASA Science News
SpaceWeather.com